

## Fam. GALLERIDÆ.

93. NEPHOPTERYX, sp.?

94. AURANA, sp.

Very close to *A. actiosella*, Walker, from Ceylon.

## EXPLANATION OF PLATE XIII.

- Fig. 1. *Heteropan dolens*, n. sp., p. 220.  
 2. *Hypsa woodfordi*, n. sp., p. 221.  
 3, 4. *Steiria variabilis*, Moore, vars., p. 223.  
 5. *Grammodes aleyona*, n. sp., p. 225.  
 6, ♂, 7, ♀. *Thalassodes timolea*, n. sp., p. 227.  
 8, ♂. *Acidalia cernea*, n. sp., p. 227.  
 9. *Micronia hermæa*, n. sp., p. 227.  
 10. *Larentia bosora*, n. sp., p. 228.

2. Notes on the Gular Brood-pouch of *Rhinoderma darwini*.

By G. B. HOWES, F.Z.S., F.L.S., Assist. Prof. of Zoology, Normal Sch. of Science and R. Sch. of Mines, S. Kensington.

[Received April 17, 1883.]

The Chilean Batrachian *Rhinoderma darwini* was among the most interesting finds of the voyage of the 'Beagle,' and its special interest lay in the fact that it was originally thought by Gay<sup>1</sup> to have been viviparous. Jiminez de la Espada disproved this in 1872, and brought to light<sup>2</sup> the remarkable fact that the gular sac of the male becomes greatly enlarged and modified, to form a brood-pouch, within which the larval metamorphoses of the young are undergone.

The specimen which furnished the subject-matter for these notes came into my hands quite recently<sup>3</sup>, in the course of an inquiry into the skeleton of the Anura<sup>4</sup>. Finding that I was able to supplement the descriptions of Espada, and seeing that his paper was published without illustration, I thought it desirable to seize the opportunity of putting on record drawings of so rare an object. The specimen itself differs in no important external character from those hitherto described. It measures from snout to vent 30 mm., that being the length given by Espada; the length of the outstretched hind limb is 62 mm., and the greatest transverse diameter of the trunk 18 mm.<sup>5</sup> The cutaneous lobes of the fore limb ('epaulettes')

<sup>1</sup> Compt. Rend. vol. ii. p. 322 (1835).

<sup>2</sup> Anales d. l. Soc. Esp. d. hist. nat. Madrid, vol. i. pp. 139-151 (1872). German abstract by Spengel, Zeitsch. wiss. Zool. vol. xxix. pp. 495-501 (1877).

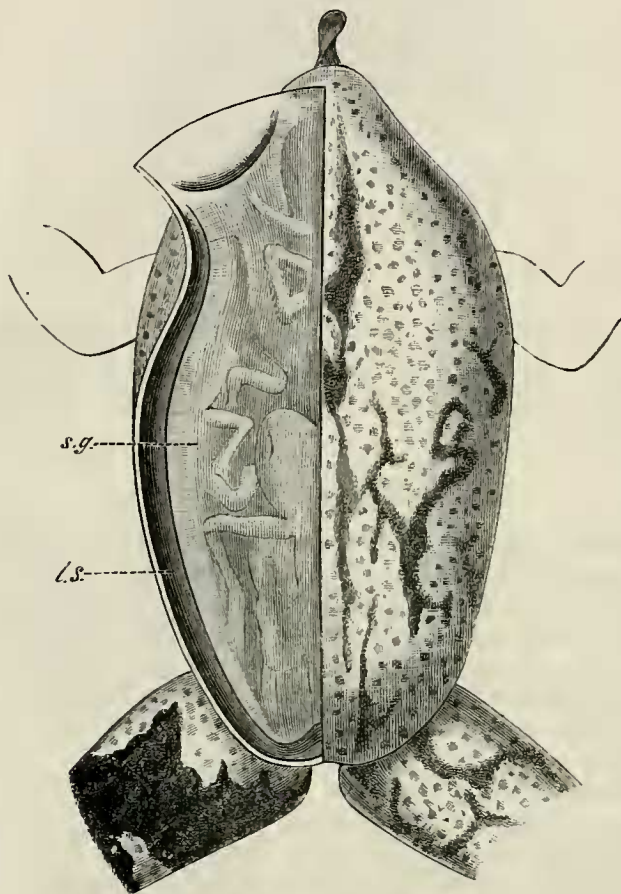
<sup>3</sup> Among some material generously placed at my disposal by my master, Prof. Huxley.

<sup>4</sup> See P. Z. S. 1888, p. 141.

<sup>5</sup> For good fig. see Gay, Hist. de Chile, Atlas, pl. 7, Erpetologia.

are somewhat smaller than usual. There appears to have been an exceptional inequality in the deposition of dark pigment on the under surface of the body and hind limbs; for with the exception of the right member, which was unusually dark, these parts were but little coloured (see fig. 1).

Fig. 1.

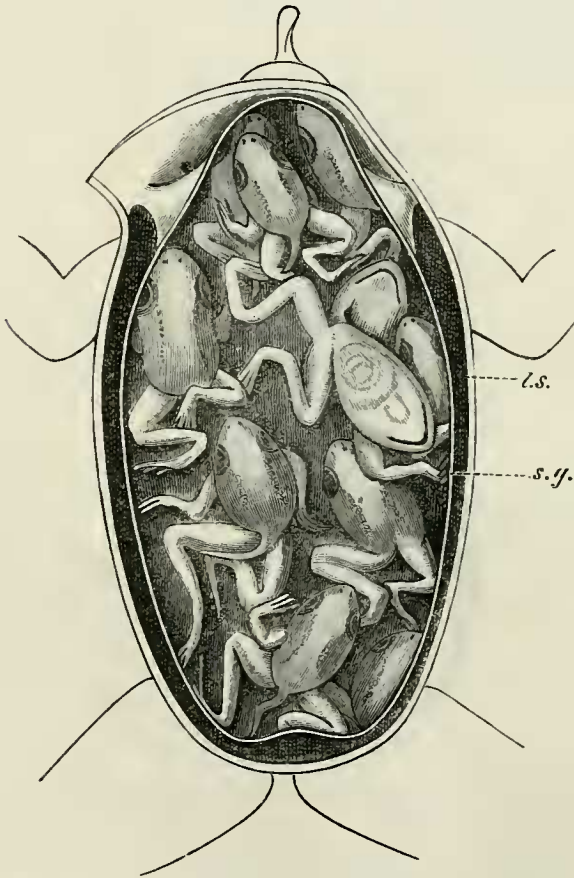
Gular sac of *Rhinoderma darwini*, adult male.

Ventral view of the trunk, the right half of the ventral integument having been removed to show the underlying gular brood-sac, *s.g.*; multiplied two and a half times.

On slitting up the ventral integument, as shown in fig. 1, the immense gular sac was at once exposed for its whole length. It occupied, as will be seen, the interspace between the body-wall and ventral integument. Anteriorly it was rounded, extending forwards to near the mentum, while posteriorly it was prolonged backwards into two insignificant cornua. The entire sac was bilaterally symmetrical, and it appears to have equalled in capacity that of any specimen examined by Espada.

That author says, in describing its attachments (Spengel's translation, p. 499), "Sie fand sich stellenweise anliegend, stellenweise vollständig verwachsen mit der Innenfläche der Haut und mit der Aussenfläche der Brust- und Bauchmuskeln." In my specimen no such confluence with the abdominal muscles was discernible; such attachments, however, as were instituted were of a very definite order. Espada states that the sac bears at the shoulders 'Zipfeln'; and this might appear to imply that it is an irregular structure, bearing lateral diverticula and accommodating itself, as it were, to its surroundings. The only fusion with the inner surface of the integu-

Fig. 2.



The same as in fig. 1, the ventral integument having been wholly reflected, and the gular sac opened up to display its contents.

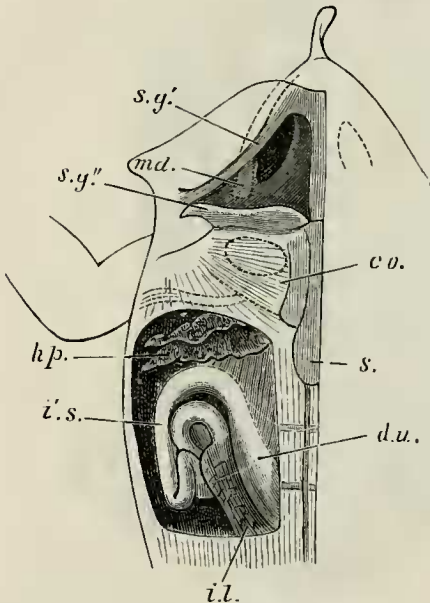
ment observable in my specimen is a bilaterally symmetrical one (figs. 1 & 2) set up near the angle of the lower jaw. The wall of the sac, elsewhere very thin and transparent, is at these points thickened, and, consequent upon its adherence to the integument, dragged out as it were laterally, to form two prolongations which answer very

satisfactorily to the aforementioned 'Zipfeln.' It will thus be seen that these outgrowths are forcible displacements, due to the mode of suspension of the gular sac, rather than casual outgrowths, as might be imagined at first sight.

Espada's statement concerning the attachment to the ventral muscles does not do justice to the facts. The brood-pouch of my specimen was found, on being raised, to hang free behind the line of attachment, and that was found to follow the anterior border of the bony clavicle. This fact is shown in fig. 3, where the greater part of the ventral wall of the sac (*s.g'*) had been removed and the small portion of its post-clavicular dorsal wall (*s.g''*) which remained turned forwards. Anteriorly to this point of attachment a complete confluence is established between the dorsal wall of the sac and the overlying floor of the mouth (see dotted line of fig. 5).

Examination of the parts *in situ* showed that all attachment is pre-clavicular, and that the main portion of the sac hangs free, the

Fig. 3.



A portion of the right half of fig. 2, dissected to show the intestine and liver, together with the mode of attachment of the gular sac.

*co*, coracoid; *du*, duodenum; *md*, angle of mandible; *s*, xiphisternum.

whole being suspended as it were from the floor of the mouth and adjacent lateral integument, and lying within the great subcutaneous lymph-space (*l.s.*, figs. 1, 2, 5).

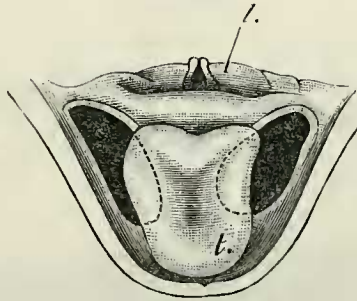
Espada mentions the fact that in one of his specimens the hinder half of the tongue was "kürzer oder zusammengezogen, wie um die Ein- und Ausgangsöffnungen des Kehlsackes frei zu lassen." This was not the case in my specimen. The tongue is (*t*, fig. 4) somewhat



contracted and asymmetrical; the orifices of the gular pouch are less modified than might have been expected (each is 7 mm. long), and the whole floor of the mouth differs in no respect from that say of a normal *Cystignathus*. The larynx (*l*, fig. 4) is situated far back, immediately behind a deep fold of the lining membrane of the floor of the mouth. Its mucous membrane was slightly swollen around the aditus; but there were neither epiglottis nor other accessory folds present, as might have been expected<sup>1</sup>.

The brood-pouch of my specimen contained 11 larvæ, that number having been exceeded (12 and 15) by two of the five specimens dissected by Espada. These little animals are represented in fig. 2

Fig. 4.



The floor of the mouth of *Rhinoderma darwini*, showing the tongue, larynx, and the orifices of the gular sac; multiplied two and a half times.

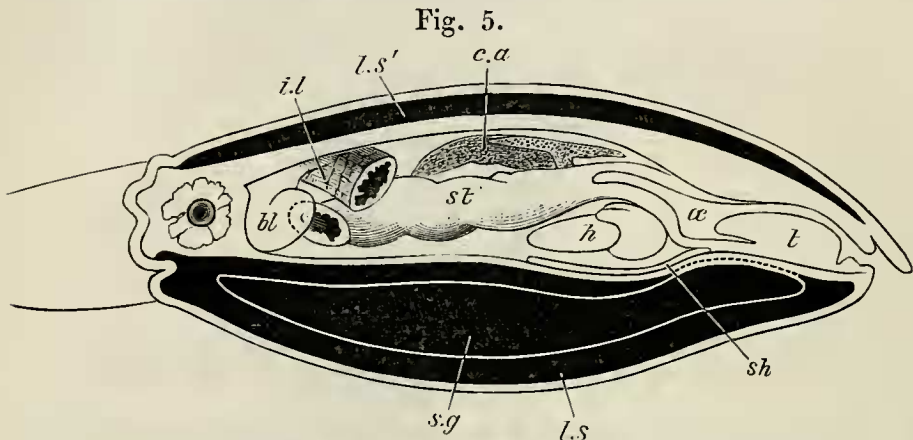
as they lay in life; and it will be seen that they were, for the most part, irregularly disposed. Espada asserts that in one of his individuals the larvæ (7 in number) were "einigermassen in zwei parallelen Reihen angeordnet"; he does not state, however, in what way the surfaces of the bodies of these or any of his specimens were disposed respecting those of the parent. Examination of fig. 2 shows that, with the exception of two individuals on the parent's left, all lay with their ventral faces in apposition with that of the adult which bore them; and it might appear from this that the larvæ are carried on their backs. These, it will be seen, were far advanced in development and, with two exceptions, disposed with their heads towards the neck of the sac, as though making their way towards the exterior. From the positions in which they lay it is tolerably certain that attempts were made by them to gain the latter in their death-struggles; and I imagine that the parent died on its back, and that a stampede ensued, in which two of the unfortunate 11 prisoners were overpowered before righting themselves.

The larvæ were, as in one of Espada's examples, unequally advanced in development. In all, both fore and hind limbs were free, the latter being webbed in three instances. Five of the 11 were caudate; and it is worthy of remark that those whose metamorphosis was

<sup>1</sup> Cf. P. Z. S. 1887, p. 499, and Spengel, *op. cit.* p. 497.

least advanced lay (as in Espada's example) at the base of the sac (cf. fig. 2). The largest larva measured 8 mm. from snout to vent, 5 mm. across the trunk at its widest part. None were young enough to show the remotest vestiges of external gills, had such existed<sup>1</sup>.

Espada found in one instance 15 young in the pouch. These were apparently in a somewhat similar condition to those of my own specimen; concerning the parent, he writes (Spengel, p. 499), "Die Eingeweide nahmen einen unglaublich kleinen (*inverosímil!*) Raum ein . . . . . bei genauerer Betrachtung stellte sich das Phänomen nicht als eine mechanische Wirkung [of the enlargement of the sac] dar, sondern als eine Rückbildung, ein Schrumpfen dieser Eingeweide,



Longitudinal section of *Rhinoderma darwini* entire, taken to one side of the middle line after removal of the embryos; to show the general relations and sectional area of the gular brood-sac (*s.g*).

*bl*, urinary bladder; *h*, heart; *l.s'*, dorsal subcutaneous lymph-sinus; *α*, cesophagus; *sh*, shoulder-girdle.

welche wie abgezehrt erschienen. Das Thier muss ohne Zweifel, so lange seine Jungen in dem Brutraume sind, zum grossen Theil seine Ernährungsfunctionen einstellen, wenn auch nicht vollständig, wie bei den Winterschläfern." I accordingly examined, with no little interest, the condition of the parts in my specimen; and this with unexpected results. The small intestine (*i.s*, fig. 3) was perfectly normal and full of food-material in an assimilable condition, while the large intestine (*i.l*) was fully charged with excreta like that of a normal individual. The stomach (*st*, fig. 5) was much distended by small Beetles and Diptera; and, but that the liver (*h.p*, fig. 3) was shrunken and displaced, and that the gall-bladder had collapsed, the alimentary viscera were those of a healthy animal in full diet.

If Espada's final deduction were correct, we might fairly expect to find the fat-body in an insignificant condition<sup>2</sup>. This was, on

<sup>1</sup> Espada failed to find traces of these in still younger larvæ.

<sup>2</sup> Cf. Knappe, "Das Bidder'sche Organ," *Morph. Jahrb.* vol. xi. (1886).

the contrary, in my specimen, comparatively large (especially so upon the left side, *c.a.*, fig. 5)—relatively larger, in fact, than in the healthy individual of the Common Frog prior to hibernation. In consideration of all the facts, I think it probable that Espada was mistaken, and that this extraordinary paternal instinct does not lead up to that self-abnegation which he supposed.

### 3. Description of a new Genus and Species of Rat from New Guinea. By OLDFIELD THOMAS.

[Received March 27, 1888.]

Among the collections recently brought from New Guinea by Mr. H. O. Forbes there occurs a specimen of Rat strongly resembling, superficially, the common small Papuan *Uromys*, *U. cervinipes*, Gould, but showing on a closer examination such characters, both external and cranial, as to necessitate the formation of a special genus for its reception: of these characters by far the most striking is its possession of a tail modified for prehension in the same fashion<sup>1</sup>, and almost to the same extent, as in the Phalangiers inhabiting the same country. Among the other members of the Myomorpha, so far as I know, the only ones that have a truly prehensile tail are *Dendromys* and the common Harvest-Mouse (*Mus minutus*), in each of which there is a tendency towards the same modification of the tail as in the present animal. Otherwise, among the whole of the Rodents, this character is only found in the South-American Porcupines. It is true that many other Rats and Mice have the power of twisting their tails round branches, and so helping themselves in climbing, but in none is this so far developed as to cause any important modification in the actual structure of the tail, as is the case in the animal now described.

The teeth, again, are remarkably complicated, and show a high degree of specialization, far more than is found in any other genus at all allied to the present one. This extreme specialization both of teeth and tail is especially remarkable in an animal inhabiting such a refuge for old and little-modified forms as New Guinea.

The following is a detailed description of the new form:—

#### CHIRUROMYS, g. n.

Externally like *Mus*, but with the terminal portion of the tail above without scales, quite naked, transversely wrinkled, and obviously prehensile. Scales of rest of tail (fig. 2, c) not, as is usual, square and arranged in distinct rings, but more or less pentagonal or lozenge-shaped, and set in diagonal slanting series, somewhat like the dorsal scales of a snake.

Skull (fig. 1, p. 238) with the infraorbital foramen typical in shape, but with its external wall narrow and not produced forwards as a projecting plate. Anterior part of zygomata projecting outwards

<sup>1</sup> Except that the curl is upwards instead of downwards.